PERFORMANCE WORK STATEMENT

ELEVATOR CONTROL UPGRADE – PERRY DAM
Perry Lake Project
Perry, KS 66073

INDEX

1. *Scope of Work*

The work covered in this statement involves furnishing all materials, equipment, and labor needed to remove existing electro-mechanical relay-based controller and elevator control system and installing a new solid-state microprocessor based controller and industrial control system. Removal of existing control system includes eradicating control unit as well as all cabling, wiring, switches, etc. associated with the unit. The contractor shall furnish and install new hoisting cables and governor rope, a new solid-state microprocessor-based elevator controller rated NEMA 4X, as well as all associated wiring/cabling including telephone communications wiring, traveling cables, selector tape, landing door switches, landing floor leveling switches, elevator door open/close interlock switches, limit switches, emergency stop switch, etc. in accordance with the latest specifications referenced in section 3 of this document.

1.1 Existing Elevator Manufacturer: EHRSAM Company of Abilene, KS (no longer elevator manufacturer)

2. *Installation Schedule*

Upon the date of official awarding of this contract, the selected contractor shall furnish submittals (reference section 6) within 10 days. All work under this contract must be completed by 30 September 2004. All work under this spec shall be performed within the normal working hours of Perry Lake Project, which is Monday – Friday from 7:00AM to 5:00PM. Any requests by the contractor to exceed these normal hours of operation during removal, installation, or testing of the system shall be made in writing and given to the Perry Lake project manager for approval.

3. *Relevant Literature*

All materials, equipment, and installation procedures noted herein shall comply with the following:

3.1 American National Standards Institute (ANSI) Standards:

1) A117.1-1998	Accessible and Useable Buildings and Facilities.
2) C57.110-1998	Recommended Practice for Establishing Transformer Capability When Supplying Nonsinusoidal Load Carriers.

3.2 American Society of Mechanical Engineers (ASME) Standards:

1) A17.1 (2002, 2003)	Safety Code for Elevators and Escalators Addenda A: 2002, Addenda B: 2003.
2) A17.2	Guide for Inspection of Elevators, Escalators, and Moving Walks Consolidation of A17.2.1, A17.2.2, and A17.2.3.
3) A17.5	Elevator and Escalator Electrical Equipment CAN/CSA-B44.1-1996
4) QEI-1-2001	Standard for the Qualification of Elevator Inspectors

3.3 National Electric Manufacturers Association (NEMA) Standards:

1) ICS 1	General Standards For industrial Control and Systems
	• ICS 1.1-1984 (R1988, R1993, R1998) – Solid State controls
	• ICS 1.3-1986 (R2001) – Preventative Maintenance
2) ICS 2-2000	Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.
3) ICS 3-1993 (R2000)	Industrial Control and Systems: Medium Voltage Controllers
4) ICS 4-2000	Industrial Control and Systems: Terminal Blocks
5) ICS 6-1993 (R2001)	Industrial Control and Systems: Enclosures
6) LI 1-1998	Industrial Laminated Thermosetting Products
7) ANSI/NEMA MG 1 1998 (Rev. 1, 2, 3)	Motors and Generators
8) ST 1-1988 (R1994, R1997)	Specialty Transformers (Except General Purpose Type)

9) ST 20-1992 (R1997) Dry Type Transformers for General Applications
10) Application Guide for AC Adjustable Speed Drives

3.4 Institute of Electrical and Electronics Engineers (IEEE): IEEE 519 – 1992 Recommended Practices and Requirements for Harmonic Control in Electric Power Systems.

3.5 National Fire Protection Association (NFPA): NFPA 70, 2002 National Electrical Code

3.6 Occupational Safety and Health Act (OSHA): Code of Federal Reg., Title 29 Part 1910 – Section 66.

3.7 Underwriters Laboratories Inc. (UL) Standards:

1) UL 360	Liquid-tight Flexible Steel Conduit (5th Edition; 25 June 2003)
2) UL 467	Standard for Grounding and Bonding Equipment (7th Edition; 15 Dec. 1993)
3) UL 508	Standard for Industrial Control Equipment (17th Edition; 28 Jan. 1999)
4) UL 1047	Isolated Power Systems Equipment (4th Edition; 30 Sept. 2003)

3.8 Corps of Engineers Guide Specifications: Division 14 – Conveying Systems, Section 14211A, "Elevators, Electric, for Civil Works".

4. *General Requirements*

4.1 Standard Products:
All material and equipment shall be standard products regularly used by manufacturer in similar elevator control projects. Elevator controls/controllers, rope, cable, wire, switches and all parts involved shall essentially duplicate those items that have proven satisfactory performance for two years prior to bid opening.

4.2 Dimensions:
The existing elevator control block currently occupies a space of approximately 60 inches high by 24 inches wide by 36 inches deep. Reference drawing 64-6590-A. The existing relay-based control block must be removed with the new microprocessor-based control cabinet put in its place. The new microprocessor-based control unit is limited to a location of approximately 9 feet high by 3 feet wide by 5 feet deep.

4.3 Qualifications of Contractor and Elevator Mechanics:
The contractor and all elevator mechanics employed to install, supervise, and test the installation shall have no less than three years of experience installing, supervising, or testing elevator controls of the type installed. The only exception to three years of previous experience shall be in the form of helpers or apprentices whom work under the direct supervision of an elevator mechanic/electrician.

4.4 Existing Hoisting Machine Work:
4.4.1 All existing hoisting machine bearings, gears, and rotary parts shall be drained and wiped clear of oil and grease. After old lubrication has been removed, hoisting machine bearings and gears shall be lubricated with new, high quality lubricant that conforms to industry standards or manufacturers instruction manual.
4.4.2 The existing hoisting machine drive motor will be retained and reused in place. It shall be aligned and adjusted in order to curtail excess vibration.

4.5 Preparatory Work:

4.5.1 The contractor shall guard and protect the hoistway (including warning signs) during installation and testing of all wiring, controls, and the controller to provide temporary barriers to minimize dust and noise levels.
4.5.2 The contractor shall take all reasonable and standard precautionary measures to protect and preserve the integrity of the elevator surfaces and finished building.
4.5.3 The contractor shall be responsible for obtaining and securing any and all required state and local elevator and inspection permits.
4.5.4 The contractor shall comply with all COE safety requirements as found in Safety and Health Requirement Manual EM 385-1-1, Nov. 2003.
4.5.5 Drawings H-1716-A, C-1716-A, and 64-6590-(A-U) are not as-built drawings and are included in this contract for information only.
4.5.6 All elevator lighting and power circuit breaker operations shall be performed by Corps of Engineers (COE) personnel.

5. *Approval of Materials/Equipment*
Approval of Materials and Equipment will be based on compliance with the manufacturer's published data. (Reference materials)

5.1 The Label of Listing of the Underwriters Laboratories, Inc. will be accepted as evidence that the materials and/or equipment conform to the standards of that agency. In addition to this listing, the contractor shall submit a statement from a nationally recognized testing agency to verify that the equipment/materials comply with the contract requirements. However, materials and equipment installed in hazardous locations shall bear the appropriate UL label unless data submitted by the testing agency has written approval from the Corps of Engineers, Kansas City District.

5.2 Equipment and/or materials not specified to conform to UL standards shall have a manufacturer's statement signed by a company official indicating complete compliance with the applicable specs or standards listed in the Relevant Literature section (Section 3 of this document).

6. *Submittals*
The contractor shall submit three copies each of the following shop drawings and data for approval. All copies shall be sent to: U.S. Army Corps of Engineers
Attn: Scott Dunwoody, OD-TM
713 Federal Building
601 East 12th St.
Kansas City, MO 64106
For each submittal the contractor shall use the engineering form 4025-R included with this package.

6.1 Category 1: Shop drawings and data for:

a. Microprocessor-based elevator controller
b. Variable frequency drive for hoisting motor
c. Harmonic Filtration System
d. Hoisting cable and governor rope
e. Conduit and grounding drawings of elevator machinery room, elevator hoistway, and associated electrical equipment.
f. Dimensional layouts in plan and elevation for all elevator equipment in elevator machinery room.
g. Junction boxes and terminal blocks
    a. Spare parts list
    b. Conduit
    c. Insulated conductors, ground wires

h. Complete wiring schematics/diagrams
i. All additional diagrams, schematics, and descriptions needed for installation, operation, and maintenance of elevator unit.
j. Operations and maintenance manuals
k. Test reports
l. Guarantees/Warranties

6.2 Shop drawings shall be reviewed within 15 working days of receipt. A rating of A, B, C, or D shall be noted on the submittal form and returned to the contractor for any further action.

7. *Operations and Maintenance Instructions*

7.1 Operations and Maintenance Manuals:
Upon acceptance of the installation the contractor shall submit five (5) copies of the Operation and Maintenance (O&M) manuals reflecting as-built conditions within 30 calendar days of work completion. O&M manuals shall be sent to the COE Contracting Officer (CO) for this project. These manuals shall contain Category 1 submittals and the following:
7.1.1 Operating Instructions: Step-by-step procedures shall be provided, which outline system start-up, operations, and shut down. The instructions shall include the manufacturer's name, model number, service manual, parts list, and a brief description of all equipment furnished under this contract and their basic operating features.
7.1.2 Maintenance Instructions: Information detailing probable breakdown areas in the system and repairs to those breakdowns shall be furnished. The instructions shall include simplified wiring diagrams and schematics for the new system as well as existing wiring still intact.

8. *Electrical Service*:
The existing electrical service for the elevator is 480 volt, 60-hertz, 3-phase alternating current, ungrounded service connected to an existing circuit breaker in the elevator machine room. After removal of all motor/elevator controls in the machine room, contractor shall install all new conduit and wiring from the new microprocessor-based elevator controls to the existing circuit breaker. Conduit and wiring shall conform to the requirements of paragraph 17.

9. *Capacity, Stops, Travel Distance, and Speed:*
The existing elevator car has a platform size of 5 feet 4 inches by 4 feet 7 inches, a capacity of 2,000 lbs., and performs five (5) front stops. The elevator travels at a speed of 100 feet per minute and travels a total of 64 ft.

10. *Car and Hoistway Doors:*
The existing elevator door operates mechanically and is fully functional. Due to limited use, an electrically operated door involving a motor, photocell, etc. shall not be used. New controls shall be tied into car/hoistway door contacts in order to relay door position (open/closed) so that controller can begin or end operation.

11. *Existing Elevator Machinery:*

11.1 Elevator Driving Machine: The existing machine is of the single overhead traction type with a single-worm and gear. The motor, brake, and traction sheave are concrete-base mounted on the machinery floor, elevation 963.50. The existing elevator driving machine is fully functional and will be used in this control upgrade.

11.2 Hoisting Motor: The existing hoisting motor is a 2-speed, squirrel-cage type motor designed to operate under NEMA standards for 60 minutes at 50 degrees centigrade. The elevator motor is designed such that the landing speed does not exceed 50 FPM and the travel speed stays below 175 FPM. The elevator also operates at rated load and rated speed without overheating hoisting equipment. The specifications for the existing elevator machinery are the following:

Traction Machine Data:

Power Supply	-	480 volts, 3 phase, 60 Hz
Car Capacity	-	2,000 lbs.
Car Speed	-	100 FPM
Car Travel	-	64 feet
Landings	-	5 elevations: 882.0, 897.0, 910.0, 926.0, 946.0
Openings	-	5 front

Two-Speed Motor Data:

Manufacturer	-	Hollister-Whitney Elevator Corporation
Frame	-	R324U
Rating	-	7.5 HP
RPM, Synch.	-	1050/320
Type	-	AC squirrel cage; E
Voltage	-	480 VAC, 3 phase, 60 Hz

11.2.1 Hoisting Motor Work: (Reference Section 3.4)
The contractor shall reuse the existing AC motor – cleaning up excess oil, lubricating the bearings, and performing any other maintenance as applicable before put into service. The existing motor wiring shall be connected to the new control unit (including variable frequency drive) and existing 3-phase, 480-volt hoisting motor. If old conductors are of insufficient length then contractor shall furnish new 600V copper wire that meets length requirements. Conductor splicing will not be acceptable.

11.3 Brake: The existing elevator brake is a shoe type, designed to stop and hold the car safely under all conditions of loading and operation. The brake is activated by the release of a spring held under compression electrically by an electromagnet. The existing circuitry applies the brake under conditions of excessive speed, activation of the emergency safety switch, or failure of the power supply. Upon any of the release conditions, circuitry opens circuit thereby removing charge to the electromagnet, which releases a spring normally held under compression thus applying the brake. The brake shall be cleaned, lubricated, and reused in this rehab.

12. *Existing Operation of Devices and Control System:*

12.1 Existing Operation: The existing elevator operation is a selective/collective automatic system. The elevator car is operated by: (a) a car operating panel containing a car-mounted, key operated on/off switch with “home”-key capability, which automatically returns the car to the top floor (elev. 946), (b) dual call switch pushbuttons (up and down) mounted along exterior of the hoistway at intermediate landings, and (c) single switch buttons at terminal landings. The existing car control panel already contains the following buttons/switches: an emergency stop switch, 120 Vac light switch for incandescent car bulb, alarm switch, and five (5) pushbuttons corresponding numerically to each landing served. The existing car-mounted station and call switch pushbuttons on each floor shall be reused in this elevator electrical rehab.

12.2 Existing Operation Devices Replacement: The existing operating devices listed below shall be reused for control inputs into the new microprocessor-based controller. Upon initial inspection, the contractor shall inspect and, IF NEEDED, replace the following individual switches/contacts with equipment of equal or better voltage and current ratings.

12.2.1 Inspectors station: (Mounting on sling)
12.2.2 Pit Stop Switch
12.2.3 Top and Bottom Slow Down, Terminal and Final Limit Switches
12.2.4 Leveling switches
  a. Mounted in hoistway
  b. Mounted on exterior of car
12.2.5 Door interlock switch for mechanical/manual operated car door.
12.2.6 Emergency Stop Switch
12.2.7 Any other switches or contacts associated with the existing elevator control unit not mentioned above.

12.3 Existing Operation Devices Reused: The existing operating devices listed below shall be reused in this elevator rehab.

12.3.1 Landing Call Switches and Lights: All call switch pushbuttons mounted outside hoistway at each landing have a face plate with small 120 Vac lamps corresponding to up (green) or down (red). The highest elevation landing (elev 946) contains one red indicator lamp, intermediate landings contain red and green lamps, and the terminal landing at lowest elevation (882 ft.) contains one green lamp to indicate the up direction. Each light illuminates when corresponding switch is depressed and remains illuminated until elevator car arrives at the landing for which the switch was depressed.

12.3.2 Car Indication Lights: Mounted inside the car, opposite the door, is an existing faceplate with two small indicator bulbs in the shape of up and down arrows. These lights illuminate green (up) and red (down) to indicate to car passengers the direction of travel.

Numerical indication lights are mounted inside car on a faceplate. The numerical digits number 1-5 and are illuminated with white light to indicate car arrival/contact at each floor during travel.

12.3.3 Emergency Alarm/Lights: An existing emergency alarm switch and corresponding emergency light fixture is located in the elevator and connected to the house annunciation system. Two fixtures illuminate upon activation of the house annunciation system as a result of high water detection or depressing emergency switch located on the car station.

12.3.4 Car Telephone: An existing car telephone is located next to the car station, inside the elevator car. The telephone is tied into the project phone network and can be used to contact other project personnel.

12.4 Control System: The existing control system and controller operate the control system in the following manner:

12.4.1 Without Attendant Operation (To call the car from a hall station or register a call from the car panel to a higher landing) With the elevator at the bottom landing and the doors closed, pressing a car station floor switch pushbutton for movement towards a higher floor activates the controller to check for a closed contact (interlock) on the mechanical door. The brake coil is energized to release the brake and power is applied to the hoist motor. A timed contact energizes the low speed travel mode with the resistance shorted out of the motor's low-speed winding. Upon energizing of the low speed contact, another timed contact is energized, which activates the high-speed travel mode. The resistance is now reapplied to the low-speed winding and the high-speed winding resistance is shorted out. The car continues traveling at high speed in the up direction until a vane on the car engages the floor selector switch at the higher landing thus removing the car from high speed travel to low speed travel. The car

then slows as the low-speed winding is energized. The car travels in low speed until the up level switch on the car engages the vane at the called landing. The car continues up in low speed until the up level switch passes the vane in the hoistway, which opens the up level switch. The brake coil is then de-energized, thus applying the brake and stopping the motor. If re-leveling is necessary the car will level up or down. The car door locks are released and passenger(s) is discharged. Elevator will remain on landing until the door is closed again and car is ready to answer other calls. Operation for the down direction is identical except down relays and switches will be energized.

12.4.2 Control Arrangement: The existing control system is arranged such that upon pressing one or more car or landing pushbuttons, the car commences movement automatically once car door interlocks make contact. The car then stops automatically at the first landing for which the landing pushbutton has been pressed. The car subsequently stops at all landings for which the pushbuttons have been pressed in the order of car travel, irrespective of the sequence in which the buttons have been pressed, assuming that the pushbuttons have been pressed prior to the cars arrival at the desired floor.

13. *Limit Switches:*

13.1 Existing Limit Switches: Existing final limit switches are mounted in the hoistway, operated by the car, and serve to stop the car in case the car travels beyond the zone of the normal terminal stopping device. The existing limit switches are of the butt contact type and break main line circuits such that current densities do not exceed 100 amperes per square inch. New limit switches shall be furnished in this elevator rehab.

13.2 New Limit Switches: New limit switches shall be furnished and installed by the contractor as per paragraph 12.2. Contacts shall be sized such that the maximum current density will not exceed 100 amperes per square inch.

14. *Existing Car Safety Devices:*
The mechanical safety brake is installed on the bottom of the car frame and is operated by a moisture-proof centrifugal governor located in the elevator machine room at the top of the hoistway. The safety device is designed to operate automatically whenever the descending speed of the car exceeds 175 FPM. The existing car safety device shall be reused in this elevator rehab and designed such that the safety device can be released locally, inside the car, via the emergency safety switch. The safety device shall also operate according to the latest ANSI standards (paragraph 3.1). The safety device shall be tied into the new elevator controls and tested by the contractor for proper operation (paragraph 24.3).

15. *Existing Speed Governor:*
A centrifugal governor controlling motor speed is equipped with the required switches and operates as per paragraph 14. The existing governor cuts off the motor current with an existing switch and also cuts off current to the brake solenoid, which releases the brake. The existing governor shall be reused in this rehab while the 3/8” galvanized steel governor rope and associated switches/contacts shall be replaced.

16. *New Controller and Hoisting Motor Control Equipment:*

16.1 Microprocessor-based Controller: The new microprocessor-based elevator control system shall govern start, stop, direction of travel, hoistway/car door lock/unlock and provide the operation and control as specified in applicable sections of paragraph 9, 10, 11, 12, 13, 14, and 15. The new elevator controller, along with the hoisting motor controls shall be listed jointly as a SINGLE system under the appropriate category by Underwriters Laboratories and shall bear the “U.L.” label. The new control system shall be coordinated with the existing equipment specified to be reused and new equipment, wiring, and switches supplied and installed by the contractor for this rehab. The simplex selective/collective elevator controls shall be performed using an 8-bit Boolean logic system with a processing speed of at least 8MHz. The

elevator control program will be stored in non-volatile, programmable, read-only memory (PROM). Construction will be performed such that controls can be changed in the future through reprogramming of the read-only memory. Safety circuits will be monitored and controlled by the Programmable Logic Control (PLC) for redundant protection. The elevator control cabinet shall be NEMA 4X rated and placed on the machinery floor in the vacated controller area that the existing relay-based controller previously occupied (paragraph 4.2 dimensions). The control cabinet shall be installed with the proper heating, cooling, and humidity controls as detailed in section 16.2. The new control system shall provide smooth acceleration from stop to slow speed to full speed and decelerate in a similar manner under all applicable load conditions.

16.2 New AC Motor Control: The existing hoist motor shall be provided with a new variable frequency drive (VFD) speed controller, UL listed integrally with the elevator microprocessor controller. The new VFD shall digitally control motor voltage, frequency, and speed and therefore be installed with an output filter in order to protect aging motor insulation (reference paragraph 16.3). The high-speed winding of the AC motor shall be permanently shorted out in order to facilitate purely high-speed motor operation for the VFD. The controller shall control start and stop functions, as well as prevent damage due to excessive load and/or transient conditions. In the event of the operation of any safety devices, the controller shall cut off all power and bring the car to rest at the nearest floor. The new controller will be enclosed in a NEMA 4X rated cabinet within the existing machine room as noted in paragraphs 4.2 and 16.1. The new controller and VFD shall operate without any function deviations in a temperature range of 0°F to 120°F and a relative humidity of 95% non-condensing. The unit will have the capacity to handle peak currents and contain a balanced coordinated fault protection system in accordance with the following:

a. Protect the complete power circuit under short circuit conditions.
b. Limit faults arising from partial grounds, or in the power supply unit.
c. Drive motor against sustained overloads. A solid-state overload circuit shall be used.
d. Motor and power unit against instantaneous peak overload.
e. Semiconductor protection against transients.
f. Phase sequence protection to ensure incoming line is phased properly.
g. Instantaneous overcurrent.
h. Low voltage on power lines (less than 75 percent of nominal).
i. Blown ac input fuse.

16.3 Harmonic Filtration: An all solid state VFD motor controller shall be supplied by the contractor, which digitally sends start, stop and speed control signals to the hoist motor. Since digital processing is used to mimic the incoming sinusoidal AC hoisting motor power, harmonics are introduced to the load side and the contractor shall supply a non-linear load filtering system. In order to fulfill this requirement, the contractor shall supply a VFD that provides the necessary filtering to limit harmonic distortion to 5% or less as per Table 10.2 of IEEE-519. If separate filters are required, calculations demonstrating compliance with this standard shall be provided with the submittals.

16.4 Elevator Controller Water Alarm Operator:

16.4.1 Elevator Car: A red, flat lens water indication light of sufficient viewing size with the word “WATER ALARM” on the lens shall be supplied and installed by the contractor. The indication light shall be placed in the elevator car on the car station control panel and interfaced with the new controller. The high water alarm shall be independent of the sump pump alarm and shall trip in the situation where water inflow exceeds the capacity of the existing sump pump. In order to facilitate this separate alarm, the contractor shall install an electrode-based water probe directly above the sump area as directed by the COR to indicate water levels that exceed pump capacity. When the high water probe is tripped, the indication light shall flash continuously until manually reset at the microprocessor-based controller in the elevator machine room. Under normal conditions with the alarm off the light shall be de-energized. All wiring shall comply with NEC Article 760.

16.4.2 Water Alarm Contact: The contractor shall supply a normally open “dry contact” to the microprocessor controller. The contact shall close when high water is detected. The single twisted pair wiring cable shall by furnished by the COE and the contractor shall tie the cable into the controller. The contractor shall specify the wire size required.
16.4.3 Operation during Water Alarm: When the microprocessor controller receives a high water alarm, the controller shall send a signal to the indicator light in the elevator to flash. The controller then shall bring the car non-stop to the service deck (landing level 5), elevation 946 ft. The car door shall unlock to remove the passengers. After passenger(s) exit and close door, the controller shall lock the door and keep the elevator at the service deck until the controller is manually reset. In the situation where the elevator car is in the emergency stop mode (car doors unlocked and car stationary) on a level the elevator will return non-stop to the service deck only after release of the emergency stop switch in the car. When an alarm is received the car shall not be allowed to travel in the downward direction.
16.4.4 Water Alarm Reset: The water alarm reset switch at the new elevator controller in the elevator machine room shall be capable of reset only by manual operation. The elevator controller shall remain non-operable even after the “dry contacts” in the water alarm cabinet have switched from the alarm (closed) state to the normally open state. In the situation where the alarm contacts are in the closed state the manual reset will not reset the elevator controller to its normal functioning mode. The contacts must be open before a manual reset can switch the controller to normal functioning mode.

16.5 Emergency Diesel Operation:
In situations where power is lost and car occupants need to be discharged, the elevator system shall be switched into transfer circuitry in order to be powered by an existing standby diesel generator. Contractor shall furnish and install all power cables from distribution panels, provide and install properly sized circuit breakers, control equipment, and any other items needed to allow for emergency diesel operation of the entire elevator system. Switching from utility power to emergency power shall not facilitate a need for manual resetting of the new controller for continuous operation during transition. Call buttons, being the only exception, shall be depressed for resumption of elevator operation.

17. *Electric Wiring:*

17.1 General: All necessary wiring for proper operation of the equipment as well as interconnections with the existing car and hall/landing station wiring shall be furnished and installed by the contractor.

17.2 Traveling Cables(cable of electrical conductors providing connection between hoist car and fixed outlet in hoistway) The existing traveling cables are type EO or equal and terminate at steel junction boxes in the hoistway and car. Cables have been run for controls, communications, lighting, etc. The contractor shall replace all traveling cables and install new traveling cables of proper length and with the sufficient number of conductors for operation described in this work statement. Each cable shall have two spare pairs of conductors as a minimum.

17.3 Switchboard Wiring: Switchboard wiring shall be stranded copper wire with 600 volt insulation and shall be Type SIS, General Electric “Vulkene” or equal. Hinge wire shall have Class K stranding.

18. *Hoist Cables*: The existing hoisting cables are ½” traction steel 8 x 19 (8 strands of 19 wires each). The traction machine uses four hoisting cables, which show evidence of rust/corrosion and shall be replaced with new hoisting cables of equal or greater strength.

19. *Grounding:*
The controllers and all metal enclosures for electric devices shall be grounded. The grounding shall conform to the requirements of the ANSI A17.1 and the NEC.

20. *Spare Parts:*
The contractor shall furnish as a minimum, beyond the working installation; one printed circuit card of each type, one set of fuses, and one set of all different power semiconductors with anti-static casing for the controller. The contractor shall furnish a complete spare parts list from their manufacturer's standard part numbers where applicable.

21. *Removed Equipment Disposal:*
All equipment (controllers, selectors, contacts, relays, conduits, wiring, etc.) removed and to be replaced by new controller shall become the responsibility of the contractor for disposal in accordance with all Federal, State, and local guidelines.

22. *Adjusting:*
After all new equipment has been installed adjustments shall be made. The contractor will make appropriate adjustments on all newly installed equipment as well as the existing equipment of the elevator.

23. *Lubrication:*
After all appropriate adjustments have been completed; the contractor shall lubricate all lubrication points of both the new and reused equipment of the elevator.

24. *Tests on Completed System:*
After completion of the new elevator control and cable (i.e. traveling, hoisting, control, and communication) installation and adjustments/lubrication have been applied, the contractor will conduct approved operating tests and acceptance tests. Acceptance tests shall be conducted per ANSI A17.1 section 8.10. These approval tests shall be full load tests made in accordance with applicable test procedures detailed in ANSI A17.1, sections 1000-1002, ASME A17.2.1 and ASME A17.S-1991, Section 20. The tests will be performed by an ANSI QEI certified elevator inspector in the presence of the contracting officer or his authorized representative. The contractor shall furnish all instruments, test weights, and personnel required for the test while the Government will furnish the necessary electrical power. The contractor shall notify the Contracting Officers Representative (COR) one day prior to the time of acceptance test performance. If any deficiencies are found during any test, the contractor will correct these deficiencies and reconduct the tests. A test report documenting all tests conducted per specs of paragraph 24 shall be supplied to the COR in the amount of 3 copies.

24.1 Test Period: The elevator shall be tested for a period of one hour of continuous run with a nominal 500lb. load in the car. During the test run, the car shall be stopped at all floors in both directions of travel for a standing period of a minimum 10 seconds per floor. A manual test of the final limits (up and down over travel) shall also be performed.

24.2 Car Leveling Tests: The elevator car leveling devices shall be tested for accuracy of landing at all floors with no load and then with full load in the car in both directions of travel.

24.3 Brake Test: A brake test shall be conducted with rated load in the car. Brakes will stop and hold the car under the rated load.

24.4 Insulation Resistance Tests: The complete wiring systems of the elevator shall be free from short circuits and grounds. Conductors will have an insulation resistance of not less than one megaohm between each conductor and ground, and between each conductor and all other conductors. Any equipment items in the finished system which are subjected to an over voltage will be disconnected prior to commencement of testing and reconnected after testing is complete. This test shall be conducted prior to any elevator ANSI or ASME tests and documented as a part of the test report.

24.5 No-Load and Load Safety Tests: Load/No-Load tests shall be performed on the elevators in full accordance with the ANSI A17.1. Code, section 1000 through 1002 as applicable.

24.6 Calibrating Governors: Tests shall be performed in accordance with Code A17.1, Rule 206.1 through 206.4. After test completion, the governor will be sealed and metal tagged with the name of the company making the test, the date of the test, and the set tripping speed.

24.7 Liability of Tests: The contractor will not be liable for damage to Government equipment being tested when the damage results directly from and as a result of the tests specified in this contract and not due to neglect by the contractor, his agents or employees. However, surface damage to the steel guide rails as a result of tests will be repaired by hand filing as part of the work under this contract.

24.8 Inspection Reports: After all other tests have been completed successfully an inspection report shall be prepared for the elevator unit based on ASME A17.2.1. An original and three (3) copies of each report shall be submitted to the CO and a fourth copy forwarded to the project manager (COR) within 30 calendar days of the inspection. The report shall show the item line number referred to, a brief description of any defect and the corrective action taken. Forms MRK 1019 and MRK 1020 will be furnished by the Government and used by the contractor with a signed copy of Form 1020 mounted in the elevator after all tests have been satisfactorily passed.

25. *Framed Schematic, Wiring and Control Diagrams:*
Framed schematic, wiring, and control diagrams showing complete layout of the entire system shall be placed under glass or lamination in the elevator machine room where directed.

26. *Guarantee:* The equipment furnished in this contract shall be guaranteed against defective materials, design, and workmanship for a minimum of one year from the date of final acceptance. Upon receipt of notice from the Government of failure of any part of the guaranteed equipment during the guaranteed time period, the affected part or parts shall be replaced at the expense of the contractor. Emergency service shall be available 8 hours a day, five (5) days per week, Monday through Friday, with a response time of 24 hours. The contractor will not be called out on Saturday, Sunday or federal holidays for emergency service. Emergency calls placed on Friday can be responded to the following Monday and still fall under the 24 hour window.

27. *Quality Control:*

27.1 General: Workmanship in conformity to this work statement shall be of the utmost grade in accordance with the best modern practices

27.2 Quality Control: Quality control procedures shall be subject to inspection by the Contracting Officer's Representative (COR) at any time. The Contractors QC plan shall contain the following significant features:

a. A description, including names and responsibilities, of the QC organization.
b. Procedures to be used to manage submittals and to ensure compliance with the approved submittals and contract requirements.
c. Procedures for ensuring compliance with the contract requirements when using subcontractors and elevator inspection personnel.
d. Actions taken when materials are found to be not in conformance with the contractual requirements.
e. Procedures for the inspection and acceptance for delivered materials.
f. Description of record keeping to document the progress, parts, and components to be supplied.

Those items or procedures not conforming to the requirements indicated in this work statement and/or COR's inspection may be rejected. The contractor shall be responsible for quality control to ensure all components and materials meet requirements of this contract.